

UNITED STATES DEPARTMENT OF AGRICULTURE

FARM SERVICE AGENCY

FINAL

**Programmatic Environmental Assessment
for Implementation of the Conservation Reserve
Enhancement Program Agreement for Oklahoma**

July 2006



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COVER SHEET

Proposed Action: The United States Department of Agriculture (USDA) Farm Service Agency (FSA) proposes to implement the Conservation Reserve Enhancement Program (CREP) agreement for the State of Oklahoma. CREP is a voluntary land conservation program for agricultural landowners.

Type of Statement: This programmatic environmental assessment (PEA) was prepared in accordance with the *National Environmental Policy Act* (42 *United States Code* 55 parts 4321 et seq., 2000), the Council on Environmental Quality implementing regulations (40 *Code of Federal Regulations* [CFR] 30 parts 1500 et seq., 2005), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 CFR 7 parts 799 et seq., 2006). This analysis is programmatic in nature and does not address individual site specific impacts, which would be evaluated for individual CREP contracts prior to approval.

Lead Agency: USDA FSA

Cooperating Agencies: USDA, Natural Resources Conservation Service, and the Oklahoma Conservation Commission

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Comments: Once this PEA is finalized, a Notice of Availability will be printed in newspapers within the vicinity of the CREP area. FSA will provide a public comment period prior to any FSA decision regarding the proposed action.

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EXECUTIVE SUMMARY

This programmatic environmental assessment identifies the possible environmental consequences resulting from the proposed implementation of the Conservation Reserve Enhancement Program agreement for the State of Oklahoma. The assessment process is designed to inform decision makers and the public about the potential environmental effects of the proposed action and to ensure public involvement in the process. The process will help decision makers take into account all environmental factors when making decisions related to the proposed action.

This programmatic environmental assessment has been prepared by the United States Department of Agriculture Farm Service Agency in accordance with the requirements of the *National Environmental Policy Act* (42 *United States Code* 55 parts 4321 et seq., 2000), the Council on Environmental Quality implementing regulations (40 *Code of Federal Regulations* 30 parts 1500 et seq., 2005), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 *Code of Federal Regulations* 7 parts 799 et seq., 2006).

Purpose and Need for the Proposed Action

The purpose of the proposed action is to implement Oklahoma's Conservation Reserve Enhancement Program agreement by removing up to 19,035 acres of riparian areas from agricultural use. Under this agreement, these lands would be enhanced by creating or restoring riparian buffers and reducing livestock access to floodplains in order to improve water quality in the Illinois River/Lake Tenkiller and Spavinaw Lake watersheds.

The Conservation Reserve Enhancement Program is needed to meet the following goals in Oklahoma:

- Improve overall water quality in two high priority watersheds
- Reduce phosphorus loading by 30 percent, nitrogen loading by 32 percent, and sediment loading by 30 percent
- Reduce excess nutrients in waterways caused by runoff from poultry litter
- Establish riparian buffers to help reduce overland flow of phosphorus to streams
- Restore riparian vegetation to stabilize stream banks and help reduce bank erosion
- Restrict livestock access to floodplains to decrease overland flow of pathogens to streams, and to decrease stream bank erosion and the subsequent sediment loading of streams
- Demonstrate both short-term and long-term benefits of riparian protection so that producers and other landowners are encouraged to utilize riparian protection as a standard part of land management.

Proposed Action and No Action Alternatives

This programmatic environmental assessment documents the analysis of the proposed action and no action alternatives. The proposed action would remove up to 19,035 acres from agricultural production and establish approved conservation practices on the land. Eligible land would be pasture or cropland located adjacent to waterbodies in the Illinois River/Lake Tenkiller and Spavinaw Lake watersheds.

The proposed action would provide participants with annual rental payments for the 15-year contract period. Rental payments would include a maintenance payment of \$10.00 per acre and an additional maintenance fee for riparian buffers in the amount of 20 percent of the rental payment. Participants would also receive a one-time signing incentive payment of \$150.00 per acre. In some cases, haying may be permitted on enrolled lands. The rental rate for lands with haying allowed would be 90 percent of the standard rental rate with no use of forage.

Participants would be compensated for conservation practice establishment costs. The Oklahoma Conservation Commission and the Farm Service Agency would pay a cost-share payment of up to 83 percent of the cost to establish the required cover. The Farm Service Agency would also issue a practice incentive payment equal to 40 percent of the practice establishment costs.

Under the no action alternative, lands would not be removed from agricultural production and conservation practices would not be implemented.

The Farm Service Agency has identified the proposed action as the preferred alternative because it is the alternative that would satisfy the purpose and need for the proposed action.

Summary of Environmental Consequences

It is expected that there would be both beneficial and temporary minor adverse impacts associated with implementation of the proposed action. A summary of the potential impacts is given in Table ES-1.

Table ES-1. Summary of potential impacts from implementation of the proposed action and no action alternatives.

| Resource | Proposed Action | No Action |
|----------------------|---|---|
| Biological Resources | <ul style="list-style-type: none"> Increased quality and abundance of wildlife and fisheries habitat, including that of protected species Establishment of migration corridors for wildlife and reduce fragmentation Increased health and persistence of fish populations Increased vegetation diversity Long-term beneficial impacts to wildlife and fisheries and vegetation Long-term beneficial impacts to six of ten protected species in the region of influence; potential adverse impacts to two protected species if riparian buffers are implemented within areas they utilize for habitat; negligible impact or slight benefit to remaining two protected species Temporary adverse impacts due to human disturbance and increased sedimentation. | <ul style="list-style-type: none"> Continued loss and degradation of wildlife and fisheries habitat Increased fragmentation of wildlife habitat Decreased health and persistence of fish populations Continued alteration and depletion of native vegetation Long-term adverse impacts to wildlife and fisheries, vegetation, and protected species. |

| Resource | Proposed Action | No Action |
|--------------------|--|---|
| Cultural Resources | <ul style="list-style-type: none"> • High potential for encountering both recorded and unidentified archaeological and architectural sites and traditional cultural properties • Actions to be reviewed with the Oklahoma State Historic Preservation Office on a site specific basis, as appropriate • No anticipated impact to cultural resources. | <ul style="list-style-type: none"> • Continuation of farming not expected to impact resource • Potential adverse impacts if agricultural practices occur on previously undisturbed lands. |
| Water Resources | <ul style="list-style-type: none"> • Reduced nutrients, pathogens, and turbidity in streams • Reduced stream bank erosion and sediment loading • Increased capability of surface water to retain dissolved oxygen • Greater rates of aquifer recharge • Reduced pollutants and sediments in wetlands • Improved function of floodplains • Long-term beneficial impacts to surface water, groundwater, and wetlands. | <ul style="list-style-type: none"> • Continued degradation of surface water, groundwater, and wetlands due to high nutrient loading, turbidity, low dissolved oxygen content, high sedimentation levels, and the presence of pathogens • Continued algae blooms and potential fish kills • Long-term adverse impacts to water resources. |
| Soil Resources | <ul style="list-style-type: none"> • Reduced wind and water erosion • Stabilization of soils and topography • No anticipated impact to paleontological resources • Temporary increase in erosion during implementation. | <ul style="list-style-type: none"> • Continuation of current rates of erosion and changes in topography. • No anticipated impact to paleontological resources. |
| Air | <ul style="list-style-type: none"> • Increased vegetation would reduce erosion and provide beneficial local impacts to air quality • May enhance carbon sequestration • Temporary, minor adverse impacts during implementation activities. | <ul style="list-style-type: none"> • No impact to existing conditions. |
| Recreation | <ul style="list-style-type: none"> • Increased opportunities for hunting, fishing, and wildlife viewing | <ul style="list-style-type: none"> • No impact to existing conditions. |

| Resource | Proposed Action | No Action |
|------------------------|---|--|
| | <ul style="list-style-type: none"> Improved water quality and aesthetics Temporary displacement of wildlife may occur during implementation Long-term beneficial impacts to recreation. | |
| Socio-economics | <ul style="list-style-type: none"> Positive net present value for land rentals Implementation would create total net present value of \$22.0 million over 15 years Increased recreation opportunities would generate economic activity. | <ul style="list-style-type: none"> Socioeconomic conditions would continue to follow current trends. |
| Environmental Justice | <ul style="list-style-type: none"> Loss of 72 farm worker positions (estimated cost of \$424,225 per year) in poverty area Installation and maintenance of conservation practices may create new positions Conservation Reserve Enhancement Program payments may generate additional non-farm employment within the community. | <ul style="list-style-type: none"> No impact to existing conditions. |
| Wild and Scenic Rivers | <ul style="list-style-type: none"> Reduced nutrients, pathogens, and turbidity in scenic rivers Reduced stream bank erosion and sediment loading Increased capability of scenic rivers to retain dissolved oxygen Long-term beneficial impacts to scenic rivers. | <ul style="list-style-type: none"> Continued degradation of scenic rivers due to high nutrient loading, turbidity, low dissolved oxygen content, high sedimentation levels, and the presence of pathogens Continued algae blooms and potential fish kills Long-term adverse impacts to scenic rivers. |

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ACRONYMS AND ABBREVIATIONS

| | |
|------|--|
| AFS | American Fisheries Society |
| ASWM | Association of State Wetland Managers |
| BEA | Bureau of Economic Analysis |
| BLS | Bureau of Labor Statistics |
| BMP | best management practice |
| BP | before present |
| CCC | Commodity Credit Corporation |
| CEQ | Council on Environmental Quality |
| CFR | <i>Code of Federal Regulations</i> |
| CWS | Canadian Wildlife Service |
| CP | conservation practice |
| CREP | Conservation Reserve Enhancement Program |
| CRP | Conservation Reserve Program |
| EO | Executive Order |
| EPA | Environmental Protection Agency |
| EQIP | Environmental Quality Incentives Program |
| FEMA | Federal Emergency Management Agency |
| FR | <i>Federal Register</i> |
| FRPP | Farm and Ranch Land Protection Program |
| FSA | Farm Service Agency |
| FWS | Fish and Wildlife Service |
| GMA | game management area |
| gpm | gallons per minute |
| GRP | Grassland Reserve Program |
| HFRP | Healthy Forests Reserve Program |

| | |
|---------|---|
| LMBV | largemouth bass virus |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | <i>National Environmental Policy Act</i> |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NSFHWAR | National Survey of Fishing, Hunting, and Wildlife-Associated Recreation |
| NWR | national wildlife refuge |
| OAS | Oklahoma Archeological Survey |
| OCC | Oklahoma Conservation Commission |
| ODEQ | Oklahoma Department of Environmental Quality |
| ODWC | Oklahoma Department of Wildlife Conservation |
| OES | Oklahoma Ecological Services |
| OSHPO | Oklahoma State Historic Preservation Office |
| OSRC | Oklahoma Scenic Rivers Commission |
| OWRB | Oklahoma Water Resources Board |
| PEA | programmatic environmental assessment |
| ROI | region of influence |
| SWCAP | Soil and Water Conservation Assistance Program |
| TCP | traditional cultural property |
| TMDL | total maximum daily load |
| USACE | U.S. Army Corps of Engineers |
| USC | <i>United States Code</i> |
| USCB | U.S. Census Bureau |
| USDA | U.S. Department of Agriculture |
| USGS | U.S. Geological Survey |
| WHIP | Wildlife Habitat Incentives Program |
| WMA | wildlife management area |

WRP Wetlands Reserve Program

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1.0 INTRODUCTION

The United States Department of Agriculture (USDA) Farm Service Agency (FSA) proposes to implement the Conservation Reserve Enhancement Program (CREP) agreement for the State of Oklahoma (Appendix A). This programmatic environmental assessment (PEA) has been prepared to analyze the potential environmental consequences associated with the proposed action and no action alternatives in accordance with the *National Environmental Policy Act* (NEPA) (42 *United States Code* [USC] 55 parts 4321 et seq., 2000), the Council on Environmental Quality (CEQ) implementing regulations (40 *Code of Federal Regulations* [CFR] 30 parts 1500 et seq., 2005), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 CFR 7 parts 799 et seq., 2006). This analysis is programmatic in nature and does not address individual site specific impacts, which would be evaluated for individual CREP contracts prior to approval.

1.1 Background

FSA was established during the reorganization of USDA in 1994. The mission of FSA is to:

“...ensure the well-being of American agriculture and the American public through efficient and equitable administration of agricultural commodity, farm loan, conservation, environmental, emergency assistance, and domestic and international food assistance programs.” (FSA 1997)

The Conservation Reserve Program (CRP) was established under Title XII of the *Food Security Act of 1985* (16 USC 58 part 3831, 1996). The purpose of CRP is to cost-effectively assist owners and operators in conserving and improving soil, water, and wildlife resources on their farms and ranches. Highly erodible and other environmentally sensitive acreage, normally devoted to the production of agricultural commodities, is converted to a long-term resource conservation cover. CRP participants enter into contracts for periods of 10 to 15 years in exchange for annual rental payments and cost-share assistance for installing certain conservation practices (CPs).

The *Farm Security and Rural Investment Act of 2002*, commonly known as the *2002 Farm Bill*, authorizes CRP through 2007 and raises the overall enrollment cap to 39.2 million acres (16 USC 58 part 3831, 1996). The *Conservation Reserve Program Final Programmatic Environmental Impact Statement* contains a detailed analysis of the impacts of implementing CRP nationwide, including the CREP component (FSA 2003a).

The Secretary of Agriculture initiated CREP in 1997. CREP is authorized pursuant to the *Federal Agriculture Improvement and Reform Act of 1996* and is a subset of CRP (7 USC 100 parts 7201 et seq., 1998). This program is based on the continuous CRP model but differs in four important ways (FSA 2006):

- CREP is targeted to specific geographic areas and designed to focus CPs on addressing specific environmental concerns.
- CREP is a partnership between USDA, State and/or tribal governments, other Federal and State agencies, environmental groups, wildlife groups, and other stakeholders who have an interest in addressing particular environmental issues.
- CREP is results-oriented, and requires States to establish measurable objectives and conduct annual monitoring to measure progress toward implementation of those objectives.

- CREP is flexible, within existing legal constraints, and may be adapted to meet local conditions on the ground.

This voluntary program uses financial incentives to encourage farmers and ranchers to enroll in contracts of 10 to 15 years in duration to remove lands from agricultural production. The two primary objectives of CREP are to:

- Coordinate Federal and non-Federal resources to address specific conservation objectives of a State and the Nation in a cost-effective manner.
- Improve water quality, erosion control, and wildlife habitat related to agricultural use in specific geographic areas.

CRP and CREP are administered by FSA in cooperation with the Natural Resources Conservation Service (NRCS), and the Oklahoma Conservation Commission (OCC). FSA is the lead agency in the development of this PEA.

1.1.1 Regulatory Compliance

This PEA has been completed as part of the NEPA process and is in compliance with CEQ and FSA implementing regulations (40 CFR 30 parts 1500 et seq., 2005; 7 CFR 7 parts 799 et seq., 2006). The intent of NEPA is to protect, restore, and enhance the human environment through well-informed Federal decisions. The following non-exclusive list of higher-tier executive orders (EOs), acts, and relevant decision and guidance documents apply to actions undertaken by Federal agencies and form the basis of the analysis presented in this PEA (see Appendix B for summaries):

- *Clean Air Act* (42 USC 85 parts 7401 et seq., 1999)
- *Clean Water Act* (33 USC 26 parts 1251 et seq., 2000)
- *Endangered Species Act of 1973*, as amended (16 USC 35 parts 1531 et seq., 1988)
- EO 11514, *Protection and Enhancement of Environmental Quality* (35 *Federal Register* [FR] 4247, 1977)
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 32, 1995)
- *National Historic Preservation Act of 1966*, as amended (16 USC 1A part 470, 2000).

1.2 Purpose and Need for Action

The purpose of this action is to implement Oklahoma's CREP agreement to reduce nutrient and sediment loading in two high priority watersheds by restoring riparian buffers and reducing livestock access to floodplains. Under this agreement, eligible farm land would be planted in grass, shrubs, and trees.

The Oklahoma CREP agreement is needed to:

- Improve overall water quality in two high priority watersheds
- Establish riparian buffers to help reduce overland flow of nutrients to streams

- Restore riparian vegetation to stabilize stream banks and help reduce bank erosion
- Restrict livestock access to floodplains to decrease overland flow of pathogens to streams, and to decrease stream bank erosion and the subsequent sediment loading of streams
- Encourage landowners to view riparian protection as a standard practice of land management.

1.3 Objectives

CREP agreements are designed to meet specific regional conservation goals and objectives related to agriculture. The proposed agreement with Oklahoma is focused on improving water quality in two high priority watersheds in eastern Oklahoma, the Illinois River/Lake Tenkiller and the Spavinaw Lake watersheds (herein referred to as the *Tenkiller* and *Spavinaw watersheds*) (Figure 1). These watersheds were selected for participation because their water quality problems are representative of other watersheds within the region and they would serve to demonstrate the benefits of riparian protection for acceptance by landowners across the region.

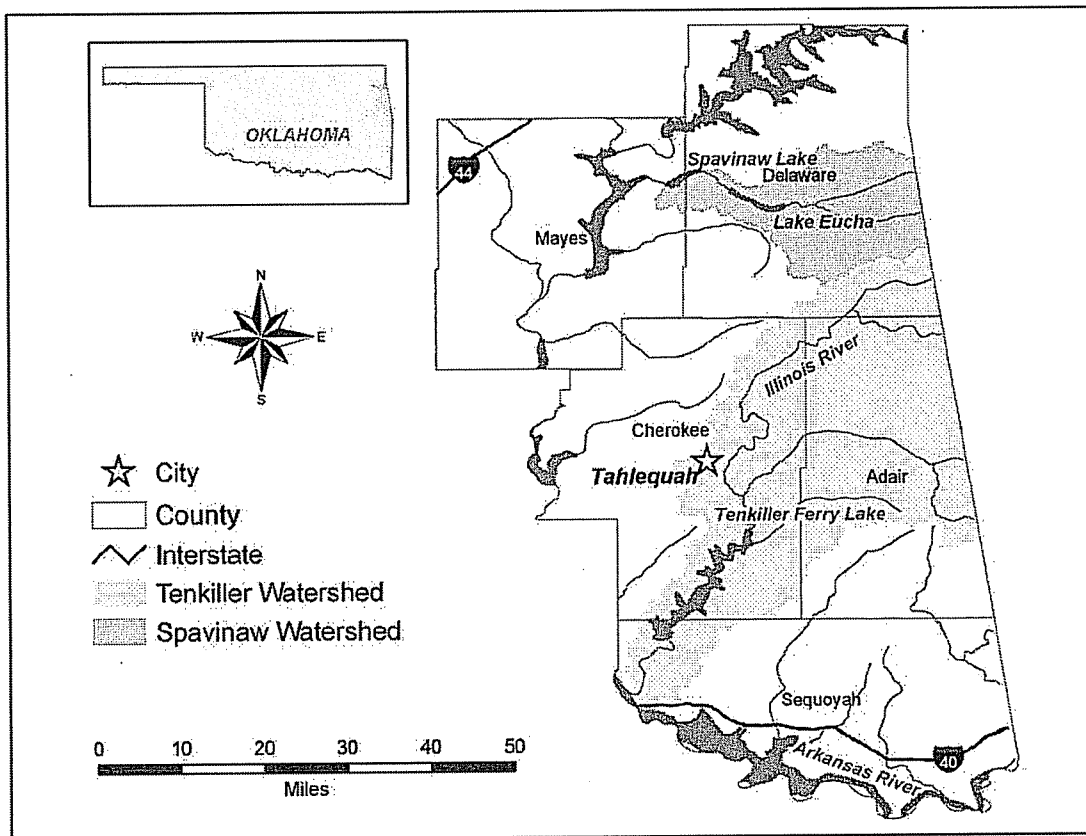


Figure 1. Oklahoma watersheds proposed for CREP enrollment.

Water quality problems in the Tenkiller and Spavinaw watersheds are due to excess nutrients, pathogenic bacteria, and sedimentation. These watersheds are major poultry growing and cattle producing areas, and a common practice has been to fertilize the soil for grazing purposes by applying poultry litter. This practice has led to the excessive buildup of phosphorus that currently pollutes waterbodies in the ROI. Excess nutrients have also caused low dissolved oxygen levels in these

waterways. Livestock access to floodplains has contributed to stream impairments from pathogenic bacteria and sedimentation.

The primary objective of the Oklahoma CREP agreement is to reduce nutrient and sediment input to specific watersheds. This would be accomplished by restoring riparian buffers to these systems and reducing livestock access to floodplains. These actions would result in less overland flow of nutrients, sediments, and pathogens to streams and less stream bank erosion. This, in turn, would result in better water quality, lower maintenance requirements to the road and highway system, and would help to preserve existing floodplain pasture. A secondary goal of CREP is to demonstrate the short-term and long-term benefits of riparian protection so that producers and other landowners will eventually accept riparian protection as a standard part of land management.

Under the proposed CREP agreement, farmers and ranchers who voluntarily participate would enter into contracts with the Federal government for 15 years, agreeing to remove portions of their land from agricultural production and plant them to grass, shrubs, and trees.

The Oklahoma CREP agreement would intend on enrolling up to 19,035 acres of riparian land within the Tenkiller and Spavinaw watersheds. This would include up to 15,172 acres in the Tenkiller watershed and up to 3,863 acres in the Spavinaw watershed. These watersheds were delineated by OCC and correspond roughly to the 11-digit hydrological unit codes in Oklahoma as mapped by the U.S. Geological Survey (USGS).

As the exact location of parcels that might be enrolled in CREP is not known at this time, the region of influence (ROI) for this PEA is considered to be 805,000 acres within the following areas:

- Tenkiller watershed (575,000 acres)—in Adair, Cherokee, Delaware, and Sequoyah counties
- Spavinaw watershed (230,000 acres)—in Delaware and Mayes counties.

The specific goals and objectives for the Oklahoma CREP agreement include the following:

- Establish up to 19,035 acres of riparian buffer in two high priority watersheds
- Reduce excess nutrients in waterways caused by runoff from poultry litter
- Reduce phosphorus loading by 30 percent, nitrogen loading by 32 percent, and sediment loading by 30 percent in these watersheds
- Demonstrate short-term and long-term benefits of riparian protection so that producers and other landowners are encouraged to utilize riparian protection as a standard part of land management.

The intended outcome of the Oklahoma CREP agreement is to enhance the ability of producers to enroll certain acreage under CRP where deemed desirable by USDA and the Commodity Credit Corporation (CCC). CCC is a Federal entity within USDA that was created to stabilize, support, and protect agricultural income and prices.

1.4 Organization of the PEA

This PEA discloses the potential impacts of the proposed action and no action alternatives on affected environmental and economic resources. Chapter 1.0 provides background information relevant to the proposed action and discusses the purpose and need for the proposed action. Chapter 2.0 describes the

proposed action and no action alternatives. Chapter 3.0 describes the baseline conditions (i.e., the conditions against which potential impacts of the proposed action and no action alternatives are measured) for each of the resource areas. Chapter 4.0 explains the potential environmental impacts to these resources. Chapter 5.0 provides an analysis of cumulative impacts and irreversible resource commitments. Chapter 6.0 describes mitigations to reduce potential impacts of the proposed action. Chapter 7.0 is a list of the preparers of this document, and Chapter 8.0 lists those persons and agencies contacted during the preparation of this document. Chapter 9.0 is a glossary of terms and Chapter 10.0 contains references used in the PEA.

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2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the alternatives, which include the proposed action and no action alternatives. These two alternatives are compared in terms of their environmental impacts and ability to achieve the objectives listed in Section 1.3. FSA has identified the proposed action as the preferred alternative because it is the alternative that would satisfy the purpose and need for the proposed action.

2.1 Proposed Action (Preferred Alternative)

The Oklahoma CREP agreement would enroll up to 19,035 acres of riparian areas in CRP (Table 1). Once the CREP agreement is approved, landowners would enroll eligible lands in the program on a voluntary basis. As such, the exact location of parcels that might be enrolled is not known at this time.

To be eligible, land must be pasture or cropland located adjacent to streams, rivers, or lakes in the Tenkiller or Spavinaw watersheds. Cropland must have been planted or considered planted to a crop in two of the five previous years, and must be physically and legally capable of being used for crop production. Marginal pastureland may also be enrolled provided it is suitable for use as a riparian buffer planted to trees, wildlife habitat buffer, or wetland buffer. In addition, land must have been owned or operated by the applicant for the previous 12 months. If the land is currently enrolled in CRP, that contract must expire before the land is considered eligible for enrollment in CREP.

2.1.1 Established Conservation Practices

The CPs proposed for implementation under the Oklahoma CREP agreement are CP21—Filter Strips and CP22—Riparian Buffer. These CPs would be installed on eligible land and according to rules in *Agricultural Resource Conservation Program for State and County Offices* (FSA 2003b). A detailed description of each practice is provided in Appendix C.

Preparation of lands for installation of CPs may include removal of existing vegetation or rocks through the use of tilling, burning, or approved agricultural chemicals. Temporary covers may be installed. Earth moving equipment may be used to construct surface dikes, dams, levies, and subsurface piping and structures to regulate water flow. Fire breaks, fencing, and roads may also be installed.

Table 1. Land in farms for the counties that are partially within the watersheds proposed for CREP enrollment.

| County | Watershed | Total Acres in County | Acres in Farms | Percentage of Total Land in Farms |
|-------------------------------|---------------------|-----------------------|----------------|-----------------------------------|
| Adair | Tenkiller | 368,639 | 237,874 | 64.5 |
| Cherokee | Tenkiller | 480,638 | 220,739 | 45.9 |
| Delaware | Tenkiller, Spavinaw | 474,238 | 282,106 | 59.5 |
| Mayes | Spavinaw | 419,838 | 302,172 | 72.0 |
| Sequoyah | Tenkiller | 431,358 | 222,350 | 51.5 |
| Source: USDA 2004, USCB 2000a | | | | |

2.1.2 Financial Support to Land Owners

The preferred alternative would provide the participant with annual rental payments for the 15-year contract period. Rental payments would include a maintenance payment of \$10.00 per acre and an

additional maintenance fee for riparian buffers in the amount of 20 percent of the rental payment. Participants would also receive a one-time signing incentive payment of \$150.00 per acre. In some cases, haying may be permitted on enrolled lands. The rental rate for lands with haying allowed would be 90 percent of the standard rental rate with no use of forage.

Participants would be compensated for practice establishment costs. OCC and FSA would pay a cost-share payment of up to 83 percent of the cost to establish the required conservation cover. FSA would also issue a practice incentive payment equal to 40 percent of the practice establishment costs.

2.2 Scoping

2.2.1 Discussion

Scoping is a process used to identify any issues that may affect environmental and social resources as a result of the proposed action, and to explore other possible ways of achieving objectives while minimizing adverse impacts. Regulatory agencies, tribal representatives, FSA specialists, and other interest groups were contacted to refine the project purpose and need, to designate resources of potential impact, and to develop preliminary alternatives.

Public involvement commenced on March 20, 2006, with letters mailed to 21 persons and agencies. A list of those contacted is available in Chapter 8 of this document. These letters included a summary of the proposed action and alternatives and solicitation for comment. No comments were received.

2.2.2 Resources Considered but Eliminated from Analysis

CEQ implementing regulations require that issues which are not significant or which have been covered by prior environmental review be identified and eliminated from detailed study (40 CFR 30 parts 1500 et seq., 2005). Accordingly, several resources have been eliminated from further analysis in this PEA. These resources and the reasons for exclusion are provided in the following discussion.

Sole Source Aquifers

The Environmental Protection Agency (EPA) defines a sole source aquifer as one which supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas have no alternative drinking water source which could physically, legally, and economically supply all those who depend upon the aquifer for drinking water (EPA 2006a). There are no sole source aquifers within the ROI (EPA 2005a).

Coastal Zones

There are no coastal zones in or near the ROI.

Noise

The proposed action would not permanently increase ambient noise levels within the ROI. Noise levels may increase slightly during installation of CPs, but this increase would be temporary and would cease after CP installation.

Traffic and Transportation

The proposed action would have no impact to existing traffic and transportation conditions in the ROI.

Human Health and Safety

The proposed action would not have any permanent or significant impact to human health and safety in the ROI.

National Natural Landmarks

A national natural landmark is an area designated by the Secretary of the Interior as being of national significance because it is an outstanding example of major biological and geological features found within the boundaries of the U.S. (36 CFR 1 parts 62.1–62.9, 2005). There are no national natural landmarks in the ROI.

Wilderness

A wilderness area is federally-owned land that has been designated by Congress for inclusion in the National Wilderness Preservation System. There are no wilderness areas in the ROI (16 USC 23 parts 1131 et seq., 1964).

2.3 Alternatives Eliminated from Analysis

No alternatives were eliminated from analysis.

2.4 Alternatives Selected for Analysis

2.4.1 Alternative A—Preferred Action

Alternative A, the preferred action, would implement the Oklahoma CREP agreement by enrolling up to 19,035 acres of riparian areas in the Tenkiller and Spavinaw watersheds in CRP. Filter strips and riparian buffers would be installed on eligible land to reduce nutrient and sediment input and improve overall water quality in the watersheds. Participants would receive annual rental and maintenance payments for the 15-year contract periods, as well as one-time signing incentive payments.

2.4.2 Alternative B—No Action

Alternative B, the no action alternative, would involve not implementing the Oklahoma CREP agreement. No land would be enrolled in CRP, and the goals for the Oklahoma CREP would not be met. This alternative would result in a continuation of current agricultural practices and the degradation of water quality due to excess nutrients and sediments.

2.5 Comparison of Alternatives

2.5.1 Identification of Geographical Boundaries

The proposed project area (i.e., ROI) is riparian land in the Tenkiller and Spavinaw watersheds. These high priority watersheds are located in the northeastern portion of Oklahoma (Figure 1). The Oklahoma CREP agreement would intend on enrolling up to 15,172 acres within the Tenkiller watershed, and up to 3,863 acres within the Spavinaw watershed. These watersheds encompass portions of Adair, Cherokee, Delaware, Mayes, and Sequoyah counties. There are no major cities within the proposed project area.

2.5.2 Identification of Temporal Boundaries

Agricultural land owners that participate in CREP would enroll lands for contracts of 15 years. It is anticipated that all eligible contracts would be signed within 3 years of the project opening date, which would roughly establish the year 2024 as the temporal boundary for the purposes of this analysis.

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3.0 AFFECTED ENVIRONMENT

This chapter describes relevant existing conditions for the resources potentially affected by the proposed action and no action alternatives. In compliance with guidelines contained in NEPA and CEQ regulations, the description of the affected environment focuses on those aspects potentially subject to impacts. Resources within the ROI are analyzed by watersheds or by counties, depending on the spatial character of the available data.

3.1 Biological Resources

3.1.1 Wildlife and Fisheries

3.1.1.1 Description

Wildlife and fisheries include terrestrial, avian, and aquatic species and the habitats in which they occur. The ROI for this resource analysis includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.1.1.2 Affected Environment

3.1.1.2.1 Wildlife

The Oklahoma Department of Wildlife Conservation (ODWC) has full and complete authority to manage the wildlife of Oklahoma. This includes approximately 51 species of amphibians, 356 species of birds, 175 species of fish, 58 species of invertebrates, 106 species of mammals, and 83 species of reptiles (ODWC 2005a). ODWC sets the hunting regulations for game species in Oklahoma, which include white-tail deer, elk, feral hogs, small game, upland game, furbearing animals, waterfowl and webless birds (Tables 2 and 4) (ODWC 2005b). ODWC also has authority over non-game species (i.e., species that are not hunted, fished or trapped).

Table 2. Common and scientific names of game species in the ROI.

| Common Name | Scientific Name | Common Name | Scientific Name |
|------------------------|---------------------------------|-----------------|-------------------------------|
| Badger | <i>Taxidea taxus</i> | Mourning dove | <i>Zenaida macroura</i> |
| Beaver | <i>Castor canadensis</i> | Muskrat | <i>Ondatra zibethicus</i> |
| Bobcat | <i>Lynx rufus</i> | Nutria | <i>Myocastor coypus</i> |
| Bobwhite quail | <i>Colinus virginianus</i> | Opossum | <i>Didelphis virginiana</i> |
| Common snipe | <i>Gallinago gallinago</i> | Pheasant | <i>Phasianus colchicus</i> |
| Cottontail rabbit | <i>Sylvilagus floridanus</i> | Prairie dog | <i>Cynomys ludovicianus</i> |
| Coyote | <i>Canis latrans</i> | Raccoon | <i>Procyon lotor</i> |
| Crow | <i>Corvus brachyrhynchos</i> | Scaled Quail | <i>Callipepla squamata</i> |
| Eastern gray squirrel | <i>Sciurus carolinensis</i> | Striped skunk | <i>Mephitis mephitis</i> |
| Eastern fox squirrel | <i>Sciurus niger</i> | Swamp rabbit | <i>Sylvilagus aquaticus</i> |
| Eurasian collared dove | <i>Streptopelia decaocto</i> | Turkey | <i>Meleagris gallopavo</i> |
| Feral hog | <i>Sus scrofa</i> | Weasel | <i>Mustela sp.</i> |
| Gray fox | <i>Urocyon cinereoargenteus</i> | White-tail deer | <i>Odocoileus virginianus</i> |

| Common Name | Scientific Name | Common Name | Scientific Name |
|--------------------|-------------------------|-------------------|-------------------------|
| Jackrabbit | <i>Lepus townsendii</i> | White-winged dove | <i>Zenaida asiatica</i> |
| Mink | <i>Mustela vison</i> | Woodcock | <i>Scolopax minor</i> |
| Source: ODWC 2005b | | | |

White-Tail Deer

White-tail deer hunting is the most popular season in the State. These deer, once nearly extirpated from the State, can now be found in all 77 Oklahoma counties. Surveys indicate that the average buck in Oklahoma weighs between 80 and 105 pounds. Average doe weight is 74 to 98 pounds. Largely due to the production of hard mast and excellent and diverse habitat, over 100 deer checked in during the 2002 hunting season weighed 200 pounds or more (Lambeth 2002).

White-tail deer, both bucks and does, can be taken by bow, gun, or primitive muzzleloader. There were 11,248 deer (6,530 bucks and 4,718 does) taken in the Tenkiller and Spavinaw watersheds in 2004 (Table 3) (ODWC 2004a). Cherokee County had the highest take of all Oklahoma counties in the 2004 season.

Table 3. White-tail deer take in the ROI in 2004.

| County | White-Tail Deer | | |
|--------------------|-----------------|-------|-------|
| | Total | Bucks | Does |
| Adair | 1,618 | 984 | 634 |
| Cherokee | 3,405 | 1,882 | 1,523 |
| Delaware | 2,240 | 1,269 | 971 |
| Mayes | 1,798 | 1,059 | 739 |
| Sequoyah | 2,187 | 1,336 | 851 |
| Source: ODWC 2004a | | | |

Feral Hogs

The three types of wild hogs in Oklahoma are feral hogs, Eurasian (Russian) wild boars, and a hybrid cross of the two (Stevens 1999). Feral hogs are found throughout many Oklahoma counties and may be found within the ROI. Feral hogs can generally adapt to any habitat, but they prefer moist bottomlands and streams and rivers. Feral hogs are omnivorous, with a vast diet that can include grasses, forbs, roots, tubers, grapes, plums, pears, acorns, mushrooms, hard and soft mast, birds, snails, insects, eggs, worms, carrion, and agricultural crops such as peanuts, oats, wheat, soybeans, and corn (Stevens 1999).

Small Game

Small game hunting in Oklahoma includes the take of rabbits and squirrels. The three species of rabbits in the State are cottontails (*Sylvilagus floridanus*), swamp rabbits (*Sylvilagus aquaticus*), and jackrabbits (*Lepus townsendii*) (ODWC 2005b). ODWC allows the hunting of two species of squirrel; the eastern fox squirrel (*Sciurus niger*) and the eastern gray squirrel (*Sciurus carolinensis*) (ODWC 2005b). All of these small game species have the potential to occur in the ROI.

Upland Game

Upland game species in Oklahoma include wild turkey, bobwhite quail, scaled quail, and pheasants (ODWC 2005b). Though once thought to be nearly extirpated from the State, wild turkeys are currently

turkey (*Meleagris gallopavo intermedia*) occurs in the western portion of Oklahoma. The eastern turkey (*Meleagris gallopavo silvestris*) occurs more in the eastern portion of the State. ODWC sets regulations for fall and spring turkey seasons.

Wild turkey habitat includes locations that provide roosting areas, nesting cover, water, food, escape cover, and brood rearing areas (Bidwell 2005). Roosting trees should have open canopies and large horizontal limbs. Nesting cover is normally located in thick ground cover such as grass, shrubs, alfalfa fields, huckleberry bushes, and grape vines, and areas around stream banks. Turkeys forage on a variety of items, such as berries, seeds, green leaves, insects, snails, and soft mast (Bidwell 2005). Feeding areas must have escape cover to protect the birds during foraging. Brood rearing areas are vicinities with grass or crop stubble, where insects are numerous and protective cover is available. Turkeys require water every day. If standing water is not available, turkeys will glean water off vegetation to fulfill their daily requirements (Bidwell 2005).

There are two subspecies of bobwhite quail that occur in Oklahoma; the eastern bobwhite (*Colinus virginianus virginianus*) and the plains bobwhite quail (*Colinus virginianus taylori*) (ODWC 2005b). Eastern bobwhites occur in only the extreme southeast corner of the State, and probably not within the ROI. Plains bobwhites can be found throughout the State and in the ROI. Bobwhite quail habitat includes areas of warm season grasses with clumps of low, brushy, woody vegetation. Populations have been found to thrive in edge habitats, which are transition areas between two different vegetation types (e.g., forest to grass).

Scaled quail occur mostly in the Oklahoma panhandle and are unlikely to be found in the ROI (ODWC 2005b). Their habitat includes arid grassland and desert scrub areas.

Ring-neck pheasants occur mostly in the north-central and northwestern portions of Oklahoma, and are unlikely to be found in the ROI (ODWC 2005b). Pheasants prefer agricultural farmlands, such as cultivated fields surrounded by fence rows or shrubby vegetation, as primary habitat. The ring-neck pheasant diet includes waste grains, insects, and weed seeds.

Furbearing Animals

Furbearer harvest in Oklahoma includes the take of raccoon, badger, mink, muskrat, opossum, weasel, bobcat, beaver, nutria, striped skunk, coyote, and gray fox (ODWC 2005b). These species have the potential to occur within the ROI. Participating in furbearer harvest in Oklahoma requires a hunting license and trapping license; however furbearing animals found destroying livestock or poultry may be taken at any time (ODWC 2005b).

Waterfowl and Webless Birds

ODWC sets the regulations for waterfowl and migratory bird hunting, which encompasses the take of ducks, geese, and other webless game birds (Table 4) (ODWC 2005b). Oklahoma is within the Central Flyway Zone that includes Montana, Wyoming, Colorado, New Mexico, Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, Alberta, Saskatchewan, and the Northwest Territories.

Non-Game Species

Oklahoma has over 900 non-game species within the State such as bats, voles, gophers, and mice. Non-game migratory species include owls, hawks, and songbirds. Black bear, mountain lion, red fox, river otter, swift fox, spotted skunk, and ringtail were all game species at one time in Oklahoma; however, population declines limited them throughout the State and led ODWC to close hunting seasons year round for these species (ODWC 2005b). The ROI is rich in non-game species such as bats and songbirds.

Table 4. Common and scientific names for waterfowl and webless game bird species in Oklahoma.

| Common Name | Scientific Name | Common Name | Scientific Name |
|------------------|-------------------------------|------------------------|---------------------------|
| American widgeon | <i>Anas americana</i> | Lesser scaup | <i>Aythya affinis</i> |
| Black rail | <i>Laterallus jamaicensis</i> | Mallard | <i>Anas platyrhynchos</i> |
| Blue-winged teal | <i>Anas discors</i> | Northern pintail | <i>Anas acuta</i> |
| Bufflehead | <i>Bucephala albeola</i> | Northern shoveler | <i>Anas clypeata</i> |
| Canada goose | <i>Branta canadensis</i> | Red-breasted merganser | <i>Mergus serrator</i> |
| Canvasback | <i>Aythya valisineria</i> | Redhead | <i>Aythya americana</i> |
| Cinnamon teal | <i>Anas cyanoptera</i> | Ring-neck duck | <i>Aythya collaris</i> |
| Coots | <i>Fulica atra</i> | Ross goose | <i>Chen rossii</i> |
| Common goldeneye | <i>Bucephala clangula</i> | Ruddy duck | <i>Oxyura jamaicensis</i> |
| Common loon | <i>Gavia immer</i> | Sandhill crane | <i>Grus canadensis</i> |
| Common merganser | <i>Mergus merganser</i> | Snow goose | <i>Chen caerulescens</i> |
| Common moorehen | <i>Gallinula chloropus</i> | Sora | <i>Porzana</i> |
| Gadwall | <i>Anas strepera</i> | Virginia rail | <i>Rallus limicola</i> |
| Greater scaup | <i>Aythya marila</i> | White-fronted goose | <i>Anser albifrons</i> |
| Hooded merganser | <i>Lophodytes cucullatus</i> | Wood duck | <i>Aix sponsa</i> |
| King rail | <i>Rallus elegans</i> | | |

Source: ODWC 2005a

3.1.1.2.2 Fisheries

ODWC safeguards and makes regulations for management of approximately 175 fish species that occur throughout the State (Appendix D). Game fish include species such as bass, catfish, crappie, walleye, and trout (Table 5) (American Fisheries Society [AFS] 2005). Oklahoma supplements its game fish population with hatchery-raised fish from four State hatcheries and one national hatchery managed by the U.S. Fish and Wildlife Service (FWS). The Durant, Holdenville, Byron, and J.A. Manning State hatcheries and the Greer's Ferry National Fish Hatchery provide anglers with increased fishing opportunities, as well as provide fish to private pond owners.

Waterways within the ROI have been inflicted with such impairments as excess nutrients, low dissolved oxygen content, the presence of pathogens, and high levels of turbidity. These impairments may limit the variance of aquatic life (EPA 2002a). Algae blooms due to phosphorus loading in waterways have been a contributor to summer fish kills.

Table 5. Popular game fish in Oklahoma.

| Common Name | Scientific Name | Common Name | Scientific Name |
|------------------|--------------------------------|----------------|--|
| Bass, largemouth | <i>Micropterus salmoides</i> | Crappie, white | <i>Pomoxis annularis</i> |
| Bass, smallmouth | <i>Micropterus dolomieu</i> | Sauger | <i>Sander canadense</i> |
| Bass, spotted | <i>Micropterus punctulatus</i> | Saugeye | <i>Stizostedion canadense x Stizostedion vitreum vitreum</i> |
| Bass, striped | <i>Morone saxatilis</i> | Shadowbass | <i>Ambloplites ariommus</i> |

| Common Name | Scientific Name | Common Name | Scientific Name |
|-------------------|--------------------------------|------------------|-----------------------------|
| Bass, white | <i>Morone chrysops</i> | Sunfish, green | <i>Lepomis cyanellus</i> |
| Bass, yellow | <i>Morone mississippiensis</i> | Sunfish, longear | <i>Lepomis megalotis</i> |
| Bluegill | <i>Lepomis macrochirus</i> | Sunfish, redear | <i>Lepomis microlophus</i> |
| Catfish, blue | <i>Ictalurus furcatus</i> | Trout, brown | <i>Salmo trutta</i> |
| Catfish, channel | <i>Ictalurus punctatus</i> | Trout, rainbow | <i>Oncorhynchus mykiss</i> |
| Catfish, flathead | <i>Pylodictis olivaris</i> | Walleye | <i>Stizostedion vitreum</i> |
| Crappie, black | <i>Pomoxis nigromaculatus</i> | | |
| Source: AFS 2005 | | | |

In 2000, the largemouth bass virus (LMBV) was found for the first time in Oklahoma in Lake Tenkiller. LMBV has been found in other species, such as other bass and sunfish, but the virus is only fatal in largemouth bass (ODWC 2004b). Since the discovery of this virus in Oklahoma, ODWC has tested for LMBV in 26 other lakes. LMBV virus was found in 21 of the 26 lakes, including Tenkiller and Eucha lakes, both of which are in the ROI (ODWC 2004b).

3.1.2 Vegetation

3.1.2.1 Description

Vegetation includes native and introduced plant species. The ROI for this resource analysis includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.1.2.2 Affected Environment

By definition, ecoregions are areas of relatively uniform ecological systems that have similar vegetation, climate, and geology. A Roman numeral hierarchy is used to denote different levels of ecoregions (Woods et al. 2005). Level I Ecoregions are the broadest level and divide North America into 15 ecological regions. Level II Ecoregions divide North America into 52 ecological regions and Level III Ecoregions divide the continental U.S. into 104 ecological regions. Level IV Ecoregions are a further division of Level III Ecoregions. Within the hierarchy of ecoregions, each lower level is more specific in regards to vegetation, climate, and geology on a smaller scale. Level III and Level IV ecoregions are typically used to describe the ecological regions of individual States.

Oklahoma is divided into 12 Level III Ecoregions. Ecoregions within the ROI are the Arkansas Valley, Boston Mountains, and the Ozark Highlands. Level III Ecoregions are further subdivided into Level IV Ecoregions or, for the purposes of discussion in this analysis, *subregions* (Table 6, Figure 2). The potential natural vegetation of the subregions within the ROI as described by Woods et al. (2005) is discussed in the following subsections.

3.1.2.2.1 Arkansas Valley

The Tenkiller watershed contains portions of three different Level III Ecoregions, one of which is the Arkansas Valley ecoregion. The Tenkiller watershed lies within the Arkansas River Floodplain of this ecoregion. The Arkansas River Floodplain subregion is typified by floodplains and low terraces along the Arkansas River. Common features are those typical of floodplain areas, such as oxbow lakes, swamps, natural levees, scars, and swales. Vegetation includes deciduous forest species such as oak (*Quercus sp.*),

sycamore (*Platanus sp.*), sweetgum (*Liquidambar styraciflua*), willow (*Salix sp.*), cottonwood (*Populus deltoids*), green ash (*Fraxinus pennsylvanica*), hackberry (*Celtis laevigata*), pecan (*Carya illinoensis*), and elm (*Ulmus sp.*), with some understory grasses. Much of this subregion has been cleared for crop production.

Table 6. Level III and Level IV Ecoregions in the ROI.

| Watershed | Level III Ecoregion | Level IV Ecoregion (Subregion) |
|-----------|---------------------|--|
| Tenkiller | Arkansas Valley | Arkansas River Floodplain |
| | Boston Mountains | Lower Boston Mountains |
| | Ozark Highlands | Springfield Plateau, Dissected Springfield Plateau—Elk River Hills |
| Spavinaw | Ozark Highlands | Springfield Plateau, Dissected Springfield Plateau—Elk River Hills |

Source: Woods et al. 2005

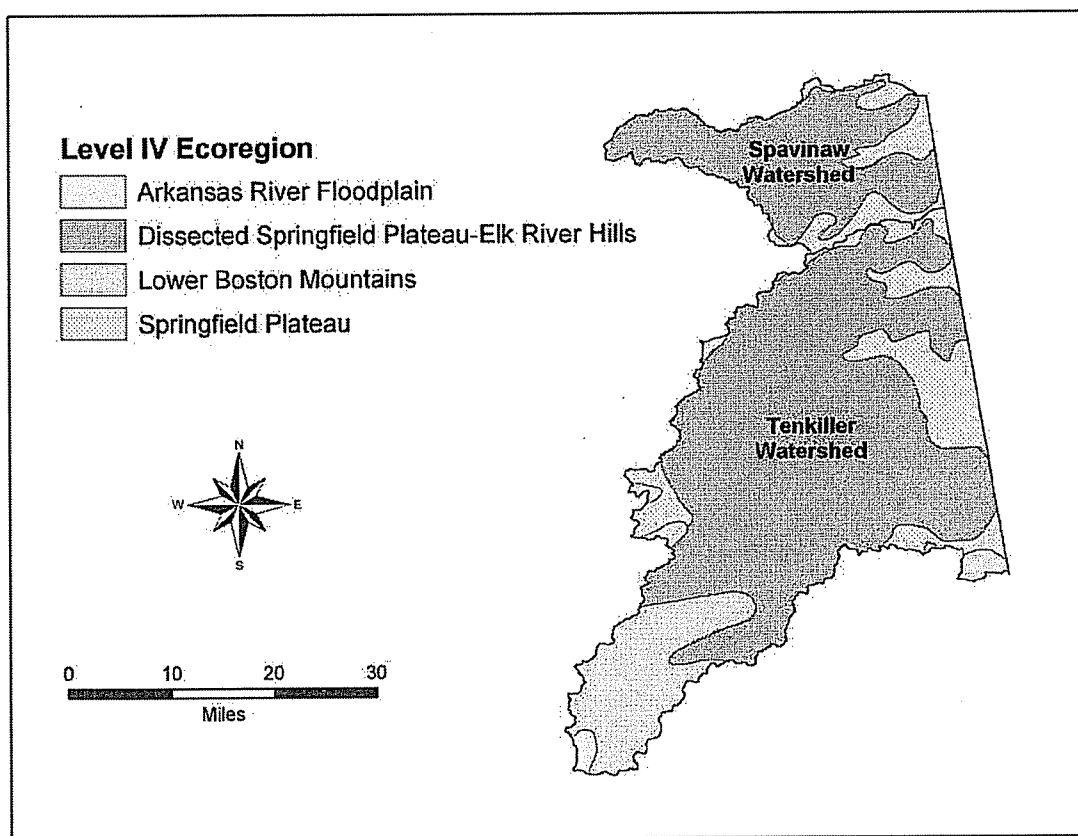


Figure 2. Level IV Ecoregions in the ROI.

3.1.2.2.2 Boston Mountains

The Tenkiller watershed is also within the Lower Boston Mountains of the Boston Mountains ecoregion. The Lower Boston Mountains subregion is characterized by rounded, high hills or low mountains, and benches. Vegetation in this subregion consists of mostly hardwood forests. Species within hardwood

forests may include blackjack oak (*Quercus marilandica*), post oak (*Quercus stellata*), black hickory (*Carya texana*), sugar maple (*Acer saccharinum*), white oak (*Quercus alba*), chinquapin oak (*Quercus muehlenbergii*), mockernut hickory (*Carya tomentosa*), birch (*Betula sp.*), sycamore (*Platanaceae sp.*), elms (*Ulmus sp.*), willows (*Salix sp.*), bitternut hickory (*Carya cordiformis*), and cottonwood (*Populus deltoides*).

3.1.2.2.3 Ozark Highlands

Both the Tenkiller and Spavinaw watersheds are located within two subregions of the Ozark Highlands ecoregion. These subregions are the Springfield Plateau and the Dissected Springfield Plateau—Elk River Hills. The Springfield Plateau subregion is characterized by level to rolling landscapes that are relatively undissected. Caves and sinkholes are common. Vegetation includes oak-hickory forests, mixed deciduous forests, and oak-hickory-pine forests. Historically, savannas and tall grass prairies were common and managed by fire. Current species within the Springfield Plateau may include black oak (*Quercus velutina*), white oak (*Quercus alba*), blackjack oak (*Quercus marilandica*), post oak (*Quercus stellata*), winged elm (*Ulmus alata*), hickories (*Carya sp.*), willow (*Salix sp.*), maple (*Acer sp.*), birch (*Betula sp.*), American elm (*Ulmus americana*), and sycamore (*Platanaceae sp.*). Primary land uses within this subregion are agriculture, including the growing of small grains, grapes, orchard fruit, or vegetables; construction of residential areas; and pastureland.

The Dissected Springfield Plateau—Elk River Hills subregion displays rolling landscapes similar to those of the Springfield Plateau subregion, but is moderately to highly dissected. Dissection is due to steep valleys and narrow ridgetops. Vegetation within the Dissected Springfield Plateau—Elk River Hills includes oak-hickory forests, oak-hickory-pine forests, mixed deciduous forests, mixed deciduous-pine forests, and bottomland deciduous forests. Species may include black oak (*Quercus velutina*), white oak (*Quercus alba*), blackjack oak (*Quercus marilandica*), hickories (*Carya sp.*), shortleaf pine (*Pinus echinata*), post oak (*Quercus stellata*), sugar maple (*Acer saccharinum*), northern red oak (*Quercus rubra*), American elm (*Ulmus americana*), and sycamore (*Plantanaceae sp.*). Primary land uses within this subregion are livestock and poultry farming, logging, grazing, and recreational activities.

3.1.3 Protected Species and Habitat

3.1.3.1 Description

Protected species are those terrestrial, avian, and aquatic species designated by FWS as threatened, endangered, or candidate species under the *Endangered Species Act of 1973*, as amended (16 USC 35 parts 1531 et seq., 1988). Critical habitats are specific geographic areas that are essential for conservation of a particular species and that have been formally designated by Federal rule.

The ROI for this resource analysis includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3. There is no critical habitat in the immediate vicinity of the ROI.

3.1.3.2 Affected Environment

FWS lists 28 protected species in Oklahoma (Table 7) (FWS 2005). Four mammals, one insect, five birds, and three mussels are listed as endangered. One reptile, two mammals, five fish, two birds, and two plants are listed as threatened. One fish, one bird, and one mussel are candidate species for listing. In addition, ODWC lists three species that the State considers threatened or endangered, but are not federally listed (Table 7) (ODWC 2005c).

Table 7. Protected species in Oklahoma.

| Species | Federal Status* | State Status* | Species | Federal Status* | State Status* |
|--|-----------------|---------------|---|-----------------|---------------|
| Alligator, American (<i>Alligator mississippiensis</i>) | T | T | Madtom, Neosho (<i>Noturus placidus</i>) | T | T |
| Bat, gray (<i>Myotis grisescens</i>) | E | E | Mapleleaf, winged (<i>Quadrula fragosa</i>) | E | --- |
| Bat, Indiana (<i>Myotis sodalis</i>) | E | E | Mucket, Neosho (<i>Lampsilis rafinesqueana</i>) | C | E |
| Bat, Ozark big-eared (<i>Corynorhinus townsendii ingens</i>) | E | E | Mussel, scaleshell (<i>Leptodea leptodon</i>) | E | E |
| Bear, grizzly (<i>Ursus arctos horribilis</i>) | T | --- | Orchid, eastern prairie fringed (<i>Platanthera leucophaea</i>) | T | --- |
| Beetle, American burying (<i>Nicrophorus americanus</i>) | E | E | Orchid, western prairie fringed (<i>Platanthera praeclara</i>) | T | --- |
| Cavefish, Ozark (<i>Amblyopsis rosae</i>) | T | T | Plover, piping (<i>Charadrius melodus</i>) | T | T |
| Crane, whooping (<i>Grus americana</i>) | E | E | Pocketbook, Ouachita rock (<i>Arkansia wheeleri</i>) | E | E |
| Crayfish, cave (<i>Cambarus zophonastes</i>) | --- | E | Prairie-chicken, lesser (<i>Tympanuchus pallidicinctus</i>) | C | --- |
| Curlew, Eskimo (<i>Numenius borealis</i>) | E | --- | Shiner, Arkansas river (<i>Notropis girardi</i>) | T | T |
| Darter, Arkansas (<i>Etheostoma cragini</i>) | C | --- | Tern, least interior population (<i>Sterna antillarum</i>) | E | E |
| Darter, blackside (<i>Percina maculate</i>) | --- | T | Trout, bull (<i>Salvelinus confluentus</i>) | T | --- |
| Darter, leopard (<i>Percina pantherina</i>) | T | T | Vireo, black-capped (<i>Vireo atricapilla</i>) | E | E |
| Darter, longnose (<i>Percina nasuta</i>) | --- | E | Wolf, gray (<i>Canis lupus</i>) | E | --- |
| Eagle, bald (<i>Haliaeetus leucocephalus</i>) | T | T | Woodpecker, red-cockaded (<i>Picoides borealis</i>) | E | E |
| Lynx, Canada (<i>Lynx Canadensis</i>) | T | --- | | | |
| *Status Codes: E = Endangered; T = Threatened; C = Candidate Source: FWS 2005, ODWC 2005c | | | | | |

Not all of the species listed by FWS occur within the ROI. Of the 28 federally-listed species, 10 have historically used or currently use habitat within or near the ROI (Table 8).

Table 8. Protected species in the ROI.

| Common Name | Watersheds of Potential Occurrence |
|---|------------------------------------|
| Bat, gray | Tenkiller, Spavinaw |
| Bat, Indiana | Tenkiller, Spavinaw |
| Bat, Ozark big-eared | Tenkiller, Spavinaw |
| Beetle, American burying | Tenkiller, Spavinaw |
| Cavefish, Ozark | Spavinaw |
| Darter, Arkansas | Tenkiller, Spavinaw |
| Eagle, bald | Tenkiller, Spavinaw |
| Mucket, Neosho | Tenkiller, Spavinaw |
| Plover, piping | Tenkiller, Spavinaw |
| Tern, least interior | Tenkiller |
| <i>Source: Oklahoma Ecological Services (OES) 2005a</i> | |

Gray Bat

The gray bat was first listed as endangered on April 28, 1976. This species is presently thought to occur in Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Missouri, Oklahoma, Tennessee, Virginia, and West Virginia (41 FR 83, 1976). This species may occur within the Tenkiller and Spavinaw watersheds (Adair, Cherokee, and Delaware counties) (OES 2005a).

Gray bats are invertivores that roost in certain caves during different seasons. Caves have specific dimensions that will either keep the cave cold in the winter or warm in the summer, depending on the needs of this species. Most summer caves are located near rivers or streams where the gray bat will go to feed. The biggest factor affecting the decline of this species is human disturbance at roosting sites. Pesticides, such as those used in agricultural practices, may also be affecting the species.

Indiana Bat

The Indiana bat was first listed by FWS on March 11, 1967, and is currently considered endangered throughout its entire range. The species is presently thought to occur in Alabama, Arkansas, Georgia, Iowa, Illinois, Indiana, Kansas, Kentucky, Maryland, Michigan, Missouri, Mississippi, North Carolina, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Virginia, Vermont, and West Virginia (32 FR 4001, 1967). This species may occur within the Tenkiller and Spavinaw watersheds (Adair, Delaware, and Mayes counties) (OES 2005a).

Indiana bats primarily roost in caves which are selected by the dimensions of the cave. In winter, the Indiana bat chooses caves that will provide stable, cold temperatures in order to allow them to retain fat supplies and expend less energy (FWS 1983). There is less known about summer requirements; however, maternity habitat seems focused around riparian areas and floodplains of smaller waterbodies. Riparian areas with mature trees that overhang waterways provide suitable foraging habitat, as Indiana bats appear to forage more on aquatic insects than terrestrial ones (FWS 1983).

Ozark Big-Eared Bat

The Ozark big-eared bat was listed as endangered throughout its entire range on November 30, 1979. This species is presently thought to occur in Arkansas, Missouri, and Oklahoma (44 FR 232, 1979). These bats

may occur within the Tenkiller and Spavinaw watersheds (Adair, Cherokee, Delaware, and Sequoyah counties) (OES 2005a).

The Ozark big-eared bat feeds primarily on moths and forages mostly in edge habitats, between open areas and forested habitat (FWS 1995). This species utilizes cliffs, caves, and rock ledges; often set in well-drained Ozark forests.

American Burying Beetle

The American burying beetle was first listed as endangered on July 13, 1989. This species is thought to occur in Arkansas, Massachusetts, Michigan, Nebraska, Ohio, Oklahoma, Rhode Island, South Dakota, and areas in Canada (54 FR 133, 1989). There have been confirmed occurrences of American burying beetles in the Tenkiller watershed (Cherokee and Sequoyah counties), and unconfirmed occurrences in the Spavinaw watershed (Adair and Delaware counties) (OES 2005a). Unconfirmed occurrences are those instances in which the species has been sighted by a reliable source, but not an FWS biologist or entomologist (OES 2005a).

American burying beetles require carrion to persist. These beetles will bury carrion underground and then lay eggs on the carrion. They stay in the same location to rear their young. Current habitat types include areas of coastal moraine grasslands, pastureland, and shrub thickets. Although it is generally agreed upon that suitable top soil and humus to bury decaying carrion is a habitat requirement, it is not known what makes the components suitable. The availability of carrion is a more important limiting factor to the American burying beetle than other habitat requirements.

Ozark Cavefish

Ozark cavefish were initially listed on November 1, 1984, and are currently considered as threatened throughout their entire range (49 FR 213, 1984). They are presently known to occur in Arkansas, Missouri, and Oklahoma. Ozark cavefish may occur within the Spavinaw watershed (Mayes County) (OES 2005a).

Ozark cavefish occupy cave streams that have pool areas. Because cave streams have limited access to sunlight, energy supply for the streams comes from other sources, such as leaf debris or bat guano (FWS 1988). Most cavefish-occupied cave streams are fed from underground aquifers rather than by surface water supply. Ozark cavefish have low metabolic requirements and have adapted to the low dissolved oxygen content found in cave streams. Areas that Ozark cavefish inhabit are usually of high water quality. Human disturbance, over-collecting, water pollution, and a low reproductive rate are the major contributors to the decline of this species (FWS 1988).

Arkansas Darter

The Arkansas darter is currently listed as a candidate species for the Federal threatened and endangered species list. The darter is known to occur only in Arkansas, Colorado, Kansas, Missouri, and Oklahoma (FWS 2004a). This species may occur within the Tenkiller and Spavinaw watersheds (Cherokee, Delaware, and Mayes counties) (OES 2005a).

Arkansas darter habitat includes areas of pebble or sand bottom pools in small streams and marshes. Streams are often spring fed and contain cool water and aquatic vegetation (FWS 2004a). Water depletion from agricultural and municipal development is the one of the biggest factors inhibiting survival of this species. Arkansas darters are poor competitors that do not thrive in habitats with great fish diversity (FWS 2004a).

Bald Eagle

FWS first listed bald eagles as endangered in 1967 but, after great conservation efforts, reclassified the species to threatened on July 12, 1995 (60 FR 133, 1995). Bald eagles are currently known to occur in all of the lower 48 States (60 FR 133, 1995). This species may occur within the Tenkiller and Spavinaw watersheds (Adair, Cherokee, Delaware, Mayes, and Sequoyah counties) (OES 2005a).

Bald eagle habitat is primarily focused around aquatic ecosystems that provide a substantial food base (60 FR 133, 1995). Aside from food base, habitat selection for the bald eagle is based on the availability of perching areas and sufficient nesting areas.

Neosho Mucket

Neosho muckets, currently listed as a candidate species for the Federal threatened and endangered species list, are known to occur in Arkansas, Kansas, Oklahoma, and Missouri (FWS 2004b). They may occur within the Tenkiller and Spavinaw watersheds (Adair, Cherokee, and Delaware counties) (OES 2005a).

Neosho mucket habitat includes waterways with stable runs, riffles with gravelly bottoms, shoals, and moderate currents (FWS 2004b). Detailed habitat and ecology information for this species is limited. Young Neosho mucket larvae are obligate parasites and will attach to fish for hosts. In Oklahoma, a population of Neosho muckets was found along a stretch of the Illinois River, from Oklahoma to the Arkansas State line down to the headwaters of Tenkiller Lake (FWS 2004b). Little evidence of recruitment was found within the Illinois River population. Loss of habitat due to dams, sedimentation, and agricultural pollution is the largest limiting factor affecting Neosho mucket populations (FWS 2004b). In the past, commercial over-harvesting for the pearl button industry decreased Neosho mucket populations (FWS 2004b).

Piping Plover

Piping plovers were listed as threatened on December 12, 1985 (FWS 1996). They are still listed as threatened, except in the Great Lakes watershed, where they are listed as endangered. Within the U.S., the piping plover is known to occur in Alabama, Colorado, Connecticut, Delaware, Florida, Georgia, Iowa, Indiana, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Maine, Minnesota, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Rhode Island, South Carolina, South Dakota, Texas, Virginia, and Wisconsin. Piping plovers may occur within the Tenkiller and Spavinaw watersheds (Cherokee, Delaware, Mayes, and Sequoyah counties) (OES 2005a).

Piping plovers migrate through Oklahoma in the spring and fall. This species utilizes sandy beaches, usually along lakes or oceans, for nesting. When nesting around rivers, piping plover habitat consists of bare sandbars and islands. The number one reason for population decline is the loss and modification of habitat.

Least Interior Tern

The least interior tern, first listed by FWS on May 28, 1985, is currently designated as endangered throughout its range (50 FR 102, 1985). Least interior terns are known to occur in Arkansas, Colorado, Iowa, Illinois, Indiana, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Dakota, Nebraska, New Mexico, Oklahoma, South Dakota, Tennessee, and Texas (50 FR 102, 1985). This species may occur in the Tenkiller watershed (Sequoyah County) (OES 2005a).

Least interior tern habitat is fairly consistent throughout their range. Nesting areas include riverine areas that are sparsely vegetated, salt flats along river shorelines, and gravel bars located within unobstructed river channels (50 FR 102, 1985). Habitat selection is based on the presence of sparsely vegetated alluvial

islands, favorable water levels during nesting, and the availability of food. In Oklahoma, least interior terns have been found nesting on barren flats within saline lakes and ponds (50 FR 102, 1985). Loss of habitat and insufficient formation of new habitat is the most limiting factor to their persistence. Construction of dams and reservoirs disrupts natural erosion processes and eliminates the formation of islands. Human disturbance in nesting habitat has also been found to be a significant limiting factor to the interior least tern (50 FR 102, 1985).

3.2 Cultural Resources

3.2.1 Archaeological Resources

3.2.1.1 Description

Archaeological resources are locations and objects from past human activities. The ROI for this resource analysis includes counties within or partially within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.2.1.2 Affected Environment

The rich cultural history of Oklahoma is illustrated by the numerous archaeological sites throughout the State. There are presently 18,219 archaeological sites in Oklahoma, 450 of which occur within or near the ROI (Table 9) (National Register of Historic Places [NRHP] 2006).

3.2.1.2.1 Prehistoric Periods (12,000–500 years present [BP])

The study of paleoecological, ethnographic, historic, and archaeological work within Oklahoma and the surrounding areas has resulted in a better understanding of the past 12,000 years of human occupation and culture within the region. It is useful to organize this information into cultural periods based on time, diagnostic artifacts or artifact assemblages from the archaeological record, and the environmental conditions that affected human adaptation to the landscape. The following is a generalized summary of the highlights of the cultures of what is now the State of Oklahoma (Oklahoma Archeological Survey [OAS] 2006).

PaleoIndian Period (12,000–8,000 years BP)

The people of this period were mobile hunters of large mammals, such as mammoth and giant bison, that are now extinct. Archaeological cultures from this period include Clovis, Folsom, and Dalton, among others. These cultures were defined on the basis of their signature stone spear points and tool assemblages.

Archaic Period (8,000–2,000 years BP)

Hunters were gradually becoming less mobile during this period. The early Archaic period people were probably as nomadic as their PaleoIndian ancestors, with later Archaic people inhabiting more permanent camps. During the early Archaic period, spear points similar to that of the PaleoIndian period were still used. However, the giant bison of the PaleoIndian period was probably already extinct going into the early Archaic period. The people of the late Archaic period had begun using bows and arrows rather than spears, and were also using rock ovens and grinding stones to grind plant food in their semi-permanent camps. During this period, the climate was much like it is today in Oklahoma.

Woodland Period (2,000–1,200 years BP)

The Woodland period is a time of transition in American Indian cultures. In this period, pottery was introduced and bows and arrows almost entirely replaced spears. The lifestyle of the Woodland period was more sedentary; people would move camp when local resources were depleted. The first sign of plant